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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,110	08/18/2003	Jeffrey F. Roeder	ATMI-605	3324
25559	7590	04/05/2006	EXAMINER EVERHART, CARIDAD	
ATMI, INC. 7 COMMERCE DRIVE DANBURY, CT 06810			ART UNIT 2891	PAPER NUMBER

DATE MAILED: 04/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/643,110

Applicant(s)

ROEDER ET AL.

Examiner

Caridad M. Everhart

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 32-36,38-40,42,44,46-48 and 50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 32-36,38-40,42,44,46-48 and 50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### Response to Arguments

Applicant has amended to include limitations on the atoms which may have a silyl group.

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 32-36, 38-40, 42, 44, and 46 rejected under 35 U.S.C. 103(a) as being unpatentable over Shapiro et al in view of Vaartstra, et al (US 5,908,947).

Shapiro et al discloses a metalloorganic precursor which satisfies the formula in the claims (col. 2, lines 60-67). In the formula 2 in col. 2, line 67, the X may be a halogen (col. 3, line 9). The metal may be Ti or Ta (col. 3, line 1). The subscripts x and y can be 1-4, and v, w, and z can be 1-4 (col. 3, lines 2-5). Claim 40 is satisfied by the disclosure that the precursor can be a mixture of compounds (col. 2, lines 30-35) and that among the compounds can be the compound in col. 4, lines 22-24 which is a silicon source.

Shapiro et al is silent with respect to the metals W, Nb, and Al.

Vaartstra discloses that in a complex with groups which may be alkylsilyl, Ti may be substituted by transition metals such as W or may be substituted by Al(col. 6, lines 15-17 and 25-30).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used W or Al in the method taught by Shapiro et al because Vaartstra discloses that Ti may be substituted by W or Al in complexes with alkylsilyl groups

Claim 42, is rejected under 35 U.S.C. 103(a) as being unpatentable over Shapiro et al as applied to claim 32 above, and further in view of Kirlin et al (US 6,320,213B1) and further in view of Su(US 4,783,430).

Shapiro et al is silent with respect to an aluminum component.

Kirlin et al discloses that titanium aluminum nitride is a desirable barrier layer which can be prepared with metalorganic precursors(col. 4, lines 57-65 and col. 5, lines 1-5).

Su discloses the formation of aluminum nitride barrier using alkylalanes(col. 2, lines 39-42).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the disclosures of Shapiro et al with that of Kirlin et al and of Su because the mixed barrier layer is useful as a barrier, and the precursors taught by Shapiro et al and by Su are useful in the allowing of low temperature deposition of the barrier layer.

Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shapiro et al as applied to claim 32 above, and further in view of Vaartstra et al (US 6,445,023B1).

Shapiro et al is silent with respect to boron in the composition.

Vaartstra et al discloses a boron source for a mixed nitride in a metalorganic deposition in which the boron source is diborane(col. 3, lines 40-57).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used the combination of the source taught by Shapiro et al because Vaartstra et al teaches that this produces a useful barrier and because diborane is a source of boron which is conventional in the art.

Claims 47 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shapiro et al as applied to claim 32 above, and further in view of Bhandari et al (US 6,379,748B1).

Shapiro et al is silent with respect to an additional silicon source.

Bhandari et al discloses that a TiSiN or TaSiN barrier is useful (col. 2, lines 37-40).

Muroyama, et al disclose a precursor with formula (I) in which M is Si and in which R1 and R2 are the same methyl or other alkyl and X is F (col. 4, lines 10-20; col. 5, lines 30-56), and b is 2. It can be seen that ethyl is included in the disclosure that R is an alkyl group, as ethyl is an alkyl group.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2891

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Everhart  
4-3-2006

  
CANDACE EVERHART  
PRIMARY EXAMINER